

The Challenges of Business Analytics: Successes and Failures

Ying Liu
St. John's University
liuy1@stjohns.edu

Henry Han
Fordham University
xhan9@fordham.edu

Joan E. DeBello
St. John's University
debelloj@stjohns.edu

Abstract

The successful use of business analytics is an important element of a company's success. Business analytics enables analysts and managers to engage in an IT-driven sense-making process in which they use the data and analysis as a means to understand the phenomena that the data represent". Not all organizations apply business analytics successfully to decision making. When used correctly, the actionable intelligence gained from a business analytics program can be utilized to improve strategic decision making. Conversely, an organization that does not utilize business analytics information appropriately will not experience optimal decision making; failing to realize the full potential of a data analytics program. This paper examines some organizations that implemented data analytics programs; both successfully and unsuccessfully, and discuss the implications for each organization. Based on the lesson learned, we present ways to implement a successful business analytics program.

1. Introduction

Today, the amount of data we collect has been exploding. Storing, managing and analyzing big data is challenging and will become a key basis of competition and a major differentiator between high performing and low performing organizations. Generating, storing and managing big data is not our ultimate goal. Once data are generated and stored, the next natural step is to analyze the data to find useful and high quality information from the data. Then knowledge may be discovered from the information. Business leaders will make critical decisions based on the newly discovered knowledge. Eventually, businesses will take actions based on the decision made to make profit. Big Data is transforming the business landscape, as companies tap into increasingly broad varieties of structured and unstructured data with greater speed and sophistication. The data revolution has enabled companies to drive innovation, discover

valuable new insights, optimize processes, and make better, more informed decisions [1].

Businesses are becoming more data intensive. These industry applications are prevalent across the realm of commerce and continue to proliferate in countless activities [2]:

- Marketing and advertising (online activities, text messaging, social media, new metrics in measuring ad spend and effectiveness, etc.)
- Healthcare (machines that provide treatment to patients, electronic health records (EHRs), digital images, wireless medical devices)
- Transportation (GPS activities)
- Energy (residential and commercial usage metrics)
- Retail (measuring foot traffic patterns at malls, demographics analysis)
- Sensors imbedded in products across industry sectors tracking usage

Business Analytics uses statistical, operations research and management tools to drive business performance. Business Analytics is a set of techniques and processes that can be used to analyze data to improve business performance through fact-based decision-making (Figure 1). Business Analytics is the subset of Business Intelligence, which creates capabilities for companies to compete in the market effectively and is likely to become one of the main functional areas in most companies. Analytics companies develop the ability to support decisions through analytic reasoning.

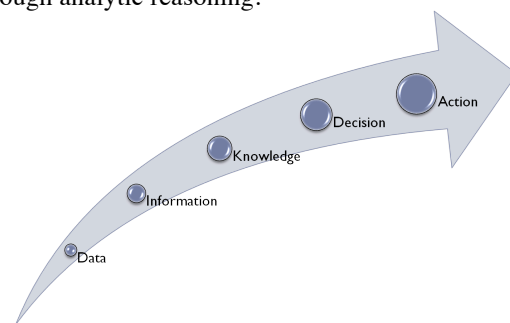


Figure 1. An overview of data analytics and decision making process

2. Benefits of Business Analytics

A business analytics program is essential to the health of a competitive organization. By analyzing key business metrics, the leadership team of the business can make smarter decisions that drive greater value for the business overall. Business analytics can also provide insight to what strategies are working and where to invest in growth. An overview will be provided to describe the specific transactional, informational and strategic benefits offered by a business analytics program.

2.1 Transactional Benefits

Transactional benefits are defined as the tangible direct outcomes of a business analytics system. These benefits include time savings, fewer meetings and reduced headcount [3]. A business analytics program is typically managed via software and online analytical processing systems. By virtue of this type of technology, business metrics can be delivered automatically to end users in a timely fashion. This real-time delivery of data can reduce the need for manual computations and the chance of errors [4]. As a result, the organization can achieve more with fewer meetings, fewer manual processes and in many cases fewer staff, which will dramatically reduce the business cost. As a business is looking to expand into new markets, it will need to continue to manage its agility so that it can scale its business processes to manage new markets. A business analytics program will help the business manage increased workloads while remaining effective in resource allocation.

2.2 Informational Benefits

A business analytics program must be able to turn raw data into usable information; thus, informational benefits of such a program include substantiated facts, the ability to discern business patterns and an increase in transparency throughout the organization (Wixom et al, 2013). Through the analysis of business metrics, an organization can track customer behaviors and purchasing patterns, improve website design, analyze user-generated content, understand market and competitive intelligence [5] and ultimately begin to forecast the future. Not only will a business analytics solution consolidate all the information about daily operations, but it will also present it to management and business users in an actionable way. Based on a survey of nearly 3000 executives, MIT Sloan Management Review reported that there is striking correlation between an organization's analytics

sophistication and its competitive performance. The biggest obstacle to adopting analytics is the lack of knowhow about using it to improve business performance [6].

Business analytics help measure how much of a business' Mission Statement will be accomplished; it provides a clearer insight through data visualization; analytics keeps the company up to date; and it offers efficiency [7, 8]. The main benefit a business will realize is an increase in revenue. In some ways this will be immediate and, in other ways, this will take time to occur. This will occur due to a precise understanding of the business and customer needs. "Analytical Insight can maximize loyalty and revenue by extending the right offer at the right time to the right customer, as well as build personal interactions between company and consumer," [9]. Ultimately, this will allow Funtastic to focus its efforts on ways to increase the number of sales from its existing customer base, as well as determine new ways to increase with new customers through the trust and loyalty from its existing customers.

2.3 Strategic Benefits

A strong strategy is supported by good business analytics. Business analytics enable organizations to understand business insights, make decisions and resolve key issues [3] that are barriers to success. A business will experience better decision making through the use of analytics. Business analytics is used "to extract information from data to make better decisions and find problems," [10]. By extracting this data to make better decisions, organizations are able to focus on what is truly best for the organization, immediately and in the future. This also ties back to an increase in revenue by being very specific with what products and services to offer [11]. After all, "adopting efficient business intelligence and reporting is vital if businesses want to stay competitive and ahead of the game," [9].

According to [4], the crux of business analytics is the combination of statistical techniques with business savvy. A business analytics program will help an organization understand its business and to deliver good business decisions quickly [3] based on data reflective of the market. A business' strategy should be a reflection of the changing market and business landscape as revealed by its analytics. Business analytics will help a business to stay innovative and ahead of their competition. Most important, the solution is essential to encourage smart decision

making. Decision making is the critical process which makes or breaks a company's goals [7].

A business analytics program has a number of benefits, ranging from transactional to informational to strategic. When combined, these benefits ultimately provide a competitive advantage to the organization by revealing trends, predicting the future and informing better decisions. A business will benefit from a business analytics program to help it grow over the next few years.

3. Successes and Failures of Applying Business Analytics to Strategic Decision Making

The need for continual analysis and innovation to remain competitive through new opportunities is what sets a lot of successful businesses apart from failing ones. The world is constantly changing. Just as new fashion and technology trends change, so does the need for business analytics and statistical analysis within an organization to adapt to an ever-changing landscape. Advances in technology, improvements in efficiencies, and opportunities to save consumers time and money force many companies to explore new ways to improve business practices.

Business Analytics Planning enables an organization to investigate the different types of statistical analysis required to execute a new business strategy and achieve the goals of an organization [4]. The ability of business analytics to be successfully applied to strategic decision making is what enables a supply-chain company to identify ways to get products to consumers faster. It is what allows marketing firms to identify what platforms to use when advertising a product or service within a target demographic. It is what enables retailers to manage inventory more efficiently and understand what goods to stock to fulfill the needs and wants of their consumers.

While the concept of Business Analytics Planning may sound simple, its application is actually very complex. The ability to gain actionable intelligence and apply that into a successful strategic decision-making initiative can be the difference between why some companies become pioneers for new ideas and why some ultimately close their doors for good. The need for the right team with a good blend of industry experience and technical expertise is crucial [4].

There are successful and failed examples of applying business analytics to strategic decision making in every business section. In this paper, we will examine the examples in two business sectors, retail industry and healthcare organizations because these

two business sectors have significant effect on our daily life. The differences in how these organizations utilize their data demonstrates exactly how critical business analytics are to the success of an organization. For the retail industry, we will explore the difference between a highly-profitable retailer: Walmart and a failing competitor within the retail industry: Kmart. For the healthcare organizations, we will examine a successful example: the American Cancer Society and a failed example: the UK National Health Service.

3.1 A Successful Example in Retail Industry: Walmart

With more than 245 million customers visiting almost 11,000 stores and 10 active global websites, Walmart generates roughly \$36 million dollars in sales every day [12]. Walmart relies on big data analytics to leverage its ability to manage supply chains and keep inventory levels optimal, perform research on constantly changing customer trends and demographics, and market across a multitude of social media outlets. Business analysts track data consisting of what customers are buying online, outcomes of local sporting events, what is trending on Twitter, and even how local weather deviations impact buying patterns [12]. Walmart collects 2.5 petabytes of unstructured data from over 1 million customers every hour [12].

Walmart has been able to take such a significant amount of unstructured data and turn it into actionable intelligence by migrating from an experiential 10 node Hadoop cluster, to a 250 node Hadoop cluster allowing data from 10 global websites to be consolidated into one massive data ecosystem [12]. This data is then analyzed to cover millions of products with 100s of millions of customers across several different sources. Data is then analyzed into 100s of millions of keywords to optimize the bidding of each keyword on a daily basis. It is with this actionable intelligence that Walmart strives to reach its primary objectives of optimizing the shopping experience for each of its customers (both online and in-store). The outcome of Walmart's ability to successfully apply business analytics to strategic decision making has resulted in 10-15% increases in online sales in incremental year-over-year revenue [12].

The quality of Walmart's business analytics plan is excellent as it combines an extremely large volume of data with the speed to analyze it quickly. Walmart's ability to not only obtain this much data, but also store and organize it allows the company to edge its competitors and drive its organization. The three most prevalent characteristics of Walmart's business analytics strategy that has led to its success over the years includes its ability to accumulate analytics,

Walmart's use of best statistical practice, and its capability of collecting and storing data through a complex network of data management systems [4]. This requires strong leadership throughout the organization with a clear vision to truly understand their customer's wants and needs.

Walmart makes data-driven strategic decisions based primarily on four functions: In the box behaviors (understanding what customers are buying), out of the box behaviors (understanding customer behaviors outside of Walmart at other retailers), stated behavior and attitudes (research of online and offline data of what is on customer's minds), and actual cross-channel purchase behaviors (understanding how online behavior influences in-store behaviors and vice versa). By analyzing data multiple ways, Walmart is able to understand and gain multiple perspectives on how customer behaviors impact sales [13].

3.2 A Failed Example in Retail Industry: Kmart

In contrast to the success Walmart has achieved with effective business analytics, the consequences of ignoring your data or analyzing it inefficiently could have serious repercussions on the overall success of your company. Kmart is a great example of when business analytics fail to be successfully applied to strategic decision making. Once, one of the largest retailers in the United States, Kmart has been on a consistent decline since the 1980s as it struggles to compete with big box retailers like Target and Walmart. Despite efforts to restructure debt, remodel stores, acquire new business partners (Sears in 2004), and even implement a new Business Intelligence Platform (Business Objects in 2003) Kmart has failed to adapt to changes in the marketplace and align business analytics with strategic goals [14].

Kmart is a great example of why simply implementing a new business intelligence system alone is not enough to succeed in business analytics. The importance of performing statistical analysis on your data to truly understand how your customers are being treated and how efficiently you are able to give them what they want is critical in the retail industry. Kmart's inability to analyze data and understand product trends and manage inventory levels would eventually result in a poor customer experiences as customers continuously complain that they are not able to find what they are looking for inside Kmart stores [15]. This is largely attributed by Kmart's failure to adapt to a more modernized "just-in-time" inventory management system (like Walmart implemented), which would have allowed the retailer to restock shelves more quickly and efficiently.

In addition, Kmart failed to differentiate itself from Walmart (low cost retailer) and Target (more focused on value-based products for younger, image-conscious demographic) by offering several low budget designer goods (Jaclyn Smith designer apparel) paired with more high end appliances (IE: Kenmore appliances) with no clear concept on how to cater to a specific target market [16]. Not only does this show Kmart's inability to capture market trends through business analytics and research, but this also shows a clear lack of leadership and organization throughout the company. Without the leadership needed to make data-driven strategic decisions, Kmart lacked the decision-making capabilities, technical practice, and use of best statistical practice to be an effective retailer [4].

As a result, Kmart's stock price fell 63% between 1998 and 2000 which ultimately would lead the company to bankruptcy in 2002 [17]. Despite several efforts to obtain new management and business partners, Kmart has continued to see declines in sales year after year. From \$37 billion in sales in its 2000 fiscal year, to \$12.1 billion in 2015, Kmart has closed hundreds of stores across the U.S. Kmart once had 2,165 stores (in 2000) to 979 in 2015 [18]. Kmart is a prime example of the consequences of poor management and an inability to leverage data to make strategic business decisions and adapt to a constantly changing market.

3.3 A Successful Example in Healthcare Organizations: the American Cancer Society

For over 100 years, the American Cancer Society (ACS) has been leading the fight against cancer illnesses. Some of their biggest assets are their websites and mobile applications that allow users to learn about screening, detection and treatment, as well as volunteer opportunities and accepting donations. The latter being extremely important as the ACS is a non-profit organization. In 2012, senior members at ACS determined they needed a better understanding of their users and a better approach to marketing. They enlisted the help of Google Analytics and marketing company Search Discovery to help them evaluate their current marketing strategy and develop a plan for emerging markets [19]. The goal of the project was to use analytics to understand how current users interacted with the ACS websites and mobile applications, monitor user behavior over time and subsequently remarket to new segments more effectively.

To better understand their users, Google Analytics was employed and the results were evaluated. It was determined that there were three main segments:

information seekers, donors, and event participants. The next step was to determine the conversion rate for each of those segments. The conversion rate is where a user visits a website and completes an action. For instance, if a user visited the ACS website to view event details, and then completed a sign-up for that event, that would be a successful conversion. A customer scoring system was developed by Search Discovery that showed when each user was successful or unsuccessful at meeting a goal [19]. The scoring system was used by the ACS marketing team to determine the health of each of their websites and to follow users' trends over time. The biggest gain, however, was that the ACS could use the information provided by the segments and scores to remarket to users by sharing fundraising ideas, or registering for local events among others [19].

The end result was that within two years, the ACS was able to successfully evaluate user patterns and subsequently develop marketing strategies to specific user segments. In one particular case, the team noticed an uptick in queries on their main site for breast cancer donors, however, they were expecting those donors to instead visit the site directly related to breast cancer. In answer to that data, they created a new promotion on their main site driving those specific donors to the breast cancer website. The result was an increase of 5.4% in revenue year over year. ACS is now using the scoring metrics to measure the performance of other website changes and redesign projects to help in their efforts to increase their reach to a new generation of support, patients and donors in the fight against cancer [19].

3.4 A Failed Example in Healthcare Organizations: the UK National Health Service

Several years ago, the UK National Health Service undertook a project to integrate all patient medical records into a central healthcare database. The analytics this project predicted from this project would have been significant and valuable to the National Health Service. Information regarding illness, treatments and costs could have been tracked allowing the system to manage its resources more effectively. Illness and health trends among the population could have informed health care providers how to counsel patients and predict illness based on risk factors. The system would have also provided oversight to ensure standard treatment protocols for various procedures, offering better patient outcomes. This effort was originally estimated to take ten years and cost €6.4bn. By 2011, the program was shut down after spending more than €10bn [20].

The failure of the NHS National IT program is directly related to several challenges. First, the effort to build this analytical platform began with a lack of clear business objectives. Each health care provider within the system had different requirements yet they needed each of their systems to work together [21]. Because the leadership team did not clearly understand, define or communicate the benefit of this effort to those affected, health care providers continued to work within their respective silos and did not find common ground upon which to build such a platform. The program was also challenged by technical difficulties stemming from a lack of expertise within the analytics team. [22] pointed to relevant technical experience as a critical component of a successful analytics project; NHS did not have this experience and therefore had issues in understanding the complexity of the system it needed to build. This resulted in vendor disputes and overall lack of progress [20]. Finally, the project defined the customer as the NHS itself. While the NHS would clearly benefit from this analytics initiative, the real customers were the patients and the providers. Had the project understood its customers and their journeys from the start, this effort may have been better supported and more reflective of the business model.

4. Implementing a Successful Business Analytics Program

Business analytics programs stress the utilization of quantitative analyses, predictive models and statistical tools to help organizational leadership gain a different view of their data, derive maximum value from its interpretation, and utilize the results to improve decision making and problem solving [23]. However, as we can see from the previous section, the implementation of a business analytics program is no small feat. The implementation of this program will require a reorganization of the company, the recruitment of new professionals, and a revamping of organization of company strategies and culture [4]. To reap the decision-making benefits of an analytics program, a business must work diligently to ensure the program is properly implemented. This implementation will include the development of an analytics team and leadership, the integration of analytics into the organizational culture through stakeholder involvement, the utilization of business intelligence systems, and the assessment of business needs and capabilities, and the application of statistical resources.

4.1 Identify Business Needs

In order to properly and successfully implement a business analytics system, a business needs to document its business needs and requirements that it wants a system to be capable of producing. This will help identify the types of analytics systems and processes that it needs to develop or bring in, as well as the staff it will need to hire in order to meet the needs. The immediate business need for a business analytics system is to enable analytics-based decisions that will allow the business to increase its revenue growth. Furthermore, the business needs a business analytics system that can leverage data to inform their decision on their strategic plan.

4.2 Build Business Analytics Team

The right business analytics team can turn massive amounts of data into insightful business knowledge that can be used to make timely business decisions. A strong business analytics team requires a unique set of skills and qualifications and piecing together these individuals can be difficult. The number one quality that most experts look for when building the team is intellectual curiosity. This quality is difficult to find because it cannot be taught or bought, but is highly desirable because technical skills alone are not enough. Organizations should seek candidates that demonstrate an involvement in a wide variety of projects and are constantly seeking to gain new knowledge. Analysts with these traits are more likely to dig deep into the data and are more effective at asking questions when performing their analysis. Companies should not be afraid to hire individuals that possess this trait but have technical skills that are lacking because skills such as math and science can be taught [24].

Organizations should be careful to not only focus on candidates that have strong skills in programming languages. The ability to script the various programming languages is vital to data analysis, however, management should also look for candidates that have the ability to communicate data through visualization. The ability to express the data visually can provide greater insights than other presentation methods. Being able to express ideas about how a business can best use the output of a data analysis is vital to the success of the analytics program. The analytics team should also seek out a leader that is the best storyteller when it comes to the data. The ability to tell the story through data is very difficult and should be done by individuals with a strong mind for business. Data can be difficult to understand in its raw format and therefore it needs a human touch added to it so that it can be understood by individuals in other areas of the business [24].

Another aspect to consider when assembling an analytics team is the use of domain experts. These experts possess the versatile skill of being able to translate the data from specific areas of the company into actionable intelligence. These individuals are necessary to make sure that the insights acquired from analytics will actually make a difference when they are applied to the operations of the business. Experts believe that the required amount of experience can vary from as little as six months in some cases to as much as ten years in industries that are highly specialized. The time required to develop these professionals is worth the investment for organizations because they add a perspective of reality that cannot be obtained from simple data analysis. It is recommended that these domain experts are rotated between the analytics team and the line of business so that they can continue to build their understanding of the day to day operations of the line of business [24].

4.2 Identify Talent

When selecting among candidates, the organization should select candidates that have strong programming skills because the best data scientists must be able to manipulate the data in addition to just viewing and analyzing it. There is a big difference between a statistician that reviews and interprets the data set and the data scientist that can change the code that collects the data. Organizations should also look for candidates that have excellent communication skills. As mentioned before, these analysts need to tell the story of the data and provide visual representations whenever possible. These candidates should be able to provide real-world examples of how they were able to use their work to improve a business process. Some analysts will provide data that will result in algorithms where a computer makes the end decisions versus others that will result in a decision made by a human. In the case of a human decision maker, the value of good communications increases greatly [25].

The best candidates will also need to be great innovators. Recruiters will need to see that these analysts can think outside the box and create something new as the business changes. Candidates that have implemented the same processes in multiple companies may not possess the innovation skills that are needed. Finally, good candidates should have a strong understanding of the business to complement their math and analysis skills [26].

4.3 Identify Skills and Certifications Needed

There are a wide variety of skill and certifications that a member of the data analytics team can possess.

The candidates that fill these positions often have different skills and backgrounds, but there are some basic skills that are needed. A data analyst should have a strong understanding of Microsoft Excel so that the data is structured properly. Excel provides a suite of functionality to make data management convenient and hassle free. The data will be useless to the analytics process if it is not properly structured. A career as a data analyst can overlap with a career in higher mathematics and statistics at one end of the spectrum or can merge with a career in programming and software development. All candidates should possess some basic skills in SQL language and have some basic knowledge of web development [26].

R and Python are two of the most popular programming languages that are learned by data analysts. R is very useful when supporting statistical computing and graphics while Python is very easy to use and is good to use on large projects. There are also many certifications that are offered directly from companies such as IBM and Oracle. These certifications can help analysts differentiate themselves from the field by showing that they have extensive knowledge of these systems [26].

4.4 Involve Stakeholders

The development of a qualified analytics team is far from sufficient in ensuring the success of an organization's business analytics program. The success or failure of an analytical endeavor can be due to the level of stakeholder support and involvement it receives. A list of business stakeholders can be found in Table 1. To achieve analytics incorporation, organization stakeholders must be involved in analytics processes. The analytics team leader must possess the communication skills necessary to advocate the program throughout the organization. The first step in advocating must be a conversation with organization executives. The analytics leader must convey the benefits of analytics to garner trust and the resources necessary for performance [27]. At the same time, this conversation must identify the goals and needs of the executives. By identifying the needs of the executives, the analytics leaders can ensure an alignment of strategies, further increasing executive's trust in the system, and the use of its results in decision making [23]. While the executives are a linchpin in creating trickle down success for program integration, the program's success will also depend on the involvement of other stakeholders throughout the organization. Leadership and business quants must meet with not only executives, but divisional leaders and all potential users of the analytic results. The analytics team must conduct interviews with these data consumers to

identify their needs and build analytical processes to meet them [23]. After implementation, the analytics team must meet with these data consumers on a frequent basis to evaluate the success of the program in meeting their needs, or identify areas of weaknesses that must be adjusted to meet their business process needs. Additionally, frequent conversations should be had with data consumers to check if their support level of analytics has changed. Through the inclusion of data consumers throughout the organization in the development of analytics, the analytics team will foster relationships that will ensure stakeholder involvement. Stakeholder involvement will foster buy-in from the data consumers, as well as on-going communication that will help promote new uses of analyses, and increased prevalence of analytics-based business decisions [4].

4.5 Create Business Analytics Culture

To truly succeed in implementation, business analytics must become an accepted component of the organization's culture [23]. Many studies on business analytics programs have found that companies who fail to integrate analytics into the organizational culture ultimately fail to deliver on program expectations. In order to ensure that the stakeholders of the organization are involved, it is important that a strong analytics-driven culture is developed. Organizations that adopt an analytics culture can create economic advantages over competitors by quickly gaining insight from data and translating it into impactful business decisions. Companies across all industries are aggressively entering into analytics by making large investments in new technologies. Companies must be sure to create an analytics driven culture because large investments in technology are not enough to be successful on their own [28].

Companies that have created strong business analytics programs have found the proper mix of investment in technology and analytical cultures. There are five recommended steps that organizations follow in order to successfully create an analytics driven culture. A strong analytics culture must be installed using a top-down approach much like any successful business program. The senior management must not only accept the culture of analytics for it to be successful, they must champion it. Users of the business analytics system must be sure that the corporate leaders are fully committed to analytics-based decision making. Leaders that show they are fully committed will make others follow suit by setting a strong example [28].

Table 1. Stakeholders of a business

Stakeholders	Role and Background	Credentials
Investors	Business leaders sponsoring business analytics	
Enterprise-Wide Advocates	Corporate-level business leaders, may carry a title such as CAO, CDO, IO, Chief Economist, or CSO. Invests in analytics at the corporate level. Leverages analytics in their decisions	Corporate-wide authority to influence the business.
Mid-Level Advocates	Unit-level business leaders. They might be preparing for a role such as CAO, CDO, CIO, Chief Economist, or CSO. Invests in analytics at the business-unit level. Leverages analytics in their decisions	Unit-wide authority to influence the business
Consumers	Those leveraging analytics in the course of performing their duties	
Ordinary Decision Makers	Makes prominent decisions for steering business. Might or might not leverage business analytics. Possesses no particular training or commitment for employing analytics	
Analytics-based Decision Makers	Makes prominent decisions for steering a business. Leverages business analytics whenever possible. Sufficiently trained to make decisions based upon analytics; collaborates with business analysts and business quants.	Trained in statistics up to the business need; knowledgeable of relevant Statistical Diagnostics.
Knowledgeable Workers	The critical mass of employees who leverage analytics results in the performance of their duties.	Typically possesses one to three semesters of analytics training.
Practitioners	Those primarily leading and performing the data analysis.	
Business Analysts	Solves analytics problems; mostly in Quadrants I and II. Applies analytics results to business problems.	
Analytics Power Users	Solves analytics and some advanced analytics problems (Quadrants I to IV). Applies analytics results to business problems. This role covers a large group of practitioners who lie midway between the Business Analysts and Business Quants.	Usually holds an advanced degree in business or a quant field.
Business Quants	Builds the more advanced analytics models and algorithms in Quadrants III and IV. Speaks the languages of business and analytics.	Advanced degree, usually in a quant field, with post-academic training; should have PSTAT or equivalent certification.
Directors	Those leading the analytics practitioners	
Ordinary Managers of Analytics	Managers for business analysts and quants; Has formal authority to manage business analysts and business quants. Needs to delegate. Speaks the business language.	Light training in analytics
Expert Leaders	Leaders for Business Analysts and Quants. An experienced business quant who leads advanced analytics projects. Speaks the languages of business and analytics. Focuses on efficiency in Quadrants I and II and solving the problems in Quadrants III and IV. Evaluates Statistical Qualifications, Diagnostics, and Review, and Data Collection, Software, and Management.	Medium to heavy training in analytics. Possesses an advanced degree (usually in a quant field) with post-academic training; PSTAT certification or equivalent.
On-Topic Business Analytics Leaders (Analytic Champions)	Quantitatively trained leaders of business analysts, business quants, and enterprise-wide analytics initiatives. Reviews corporate analytics needs and capabilities as an input to corporate strategy. Seeks new killer applications. Leads business analytics projects. Bilingual: speaks the languages of business and analytics. Expert leader + Formal Authority.	

An analytics driven culture can ensure that all employees are on the same page about the specific business objective that the analytics system is attempting to solve. Employees must be aware of both the importance of the analytics and the objectives in order to create a successful analytics

culture. One of the most common cause of failures for analytics initiatives is a lack of clearly defined business goals. The best companies use analytics to solve very specific business questions. General business goals such as increasing revenue are not

enough and do not generate as much success as the more specific goals [28].

Companies must openly share information and data to develop an analytics-driven culture. Information must be broken down into information silos in order to eliminate multiple versions of the truth. This can only happen when stakeholders throughout the organization openly share data and information and gaps between IT and the lines of business must be bridged. IT teams must ensure that the lines of business have access to the information they need. The lines of business must ensure that they collaborate with IT and amongst themselves to ensure data security and governance. All departments must adopt a shared data approach to make unbiased decisions for the best of the company [28].

Companies that involve more employees in the analytics process are usually more successful. It is critical that they cultivate and empower citizen data scientists which are non-IT users that can be embedded in the lines of business. The users will ultimately be responsible for driving innovation through analytics. Companies must invest in analytics technology that does not require advanced degrees to operate. The best systems allow data scientists to build analytics models and workflows using reusable templates that can later be used by non-IT users. Companies can also share analytics models outside of the organization through the use of online market places. This is an excellent way to empower the citizen data scientists and help foster an analytics-driven culture. Companies that have implemented a strong analytics-driven culture must be sure to make decisions based on what the data tells them. The previous steps will be useless if companies continue to make decisions using gut feelings or past experience [28].

4.6 Identify Dataset and Best Statistical Practice

As part of the identification of the business needs and use cases for a business analytics system, it is key to identify the appropriate datasets that are important to the analytics-based decision making process. Without the appropriate dataset from which to conduct analysis, the analytic outputs will provide irrelevant information to the decision makers.

As data is collected, stored, and analyzed, it creates the infrastructure for making effective decisions. However, there are three components of analytics-based decision making that must be considered in order to be considered truly effective. They are statistical qualifications, statistical

diagnostics, and statistical review [4]. First, statistical qualifications relate to the qualifications of the analytical team. The team should have sufficient statistical knowledge obtained through education and background experience [4]. In addition, they need to be effective communicators that can translate statistical models and results to a non-technical audience of upper management and executive members. Furthermore, analytic team members must understand statistical models and techniques and possess the knowhow of which models and techniques should be used when [4].

Next, statistical diagnostics should be reviewed. Statistical diagnostic techniques determine the quality of a data analysis [4]. The techniques help examine areas of weakness or mistakes in the analysis, the accuracy and reliability of the analysis, looks at how the results should be interpreted, and generates solutions to help improve the analysis [4]. A business can use any number of statistical diagnostic techniques to determine important site data from the median income of retirement aged individuals in the area, to reviewing census data retrieved from community members.

Lastly, a statistical review should be conducted. A statistical review checks the process involved in making analytics-based decisions [4]. The scope of the review is wide and includes information regarding the accuracy and speed at which the data was accrued [4]. It questions how well the analytic models were constructed to fit the analytic need, how effective the analytic software was, and how quickly the results of the analysis were obtained [4]. Lastly, the review looks at how the process can be improved for future use. Once the best statistical practice steps are considered, then decision makers can make the most of business analytics and feel more confident and secure in the decisions they need to make.

6. Conclusions

In conclusion, in order to succeed in the age of big data, organizations need to adopt new thinking and approaches to analytics. Data is being generated at a volume and velocity of extreme intensity and business analytics is making it possible for companies to meet emerging business demands that allow them to stay ahead of the competition. As each company embarks on their own analytical journey, they set out to utilize their data to open the door to new opportunities, new connections, and new insights that could not be seen before.

7. References

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